TH 148
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Issued by
THE LADIES' HOME JOURNAL
Independence Square
Philadelphia

TH148
.W5

NOTE.—The price of building materials varies to such an extent in different localities that the comparative lists mentioned in connection with this article can only be considered as approximate.

JAN -7 1915
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15-4405

What You Should Know When Building a Little House

By CHARLES E. WHITE, JR., M. A. I. A.

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IT IS hardly necessary to state here why one should build one's own home; why it is better to own than to rent—what particular advantages *your* house has over the *landlord's*. Practical reasons for building are well understood by most people. Briefly they are these:

There is *comfort* in owning your home impossible to secure in the average house built to rent. This is brought about by one very important condition—*cost*. Your landlord building to rent cannot afford to design and construct a house containing the many clever and pretty things you desire. He must keep the construction down to the general necessities.

Then after comfort comes the honest *pride of ownership*. We all love that which is ours. We enjoy planning, building and arranging the new home, and we derive a certain amount of pleasure every day of our lives from actually possessing the house which shelters our family. Property owners are always considered the most stable members of a community, so when we become property owners, in however small a degree, we take our places among men and women of particular importance. Our interest in town or village affairs increases, our intelligence is intensified and we seem to be a tangible part of the machinery of the community which we have, in our small way, improved by our home investment.

Economy, too, must be recognized as an element in home-making—a not unimportant factor. Though it might not be possible in every home-building operation to figure that, say, an investment of $3000 will yield great financial returns, yet, considering the matter broadly, $3000 invested in a home brings in many cases satisfactory financial increase. In other words, $3000 invested in business might yield more profit in *dollars and cents* than the same sum invested in a home, but one should not for this reason bar out the home investment. With land judiciously selected in a location which seems to promise increase in value, and with a new house attractively designed and well built (at not too great cost), one should be able to sell later, if desired, at fair profit. In considering the home project, however, do not too rigidly adhere to the *dollars-and-cents* side of the problem. For instance, tile walls and floor in the bathroom (costing more than a hardwood floor and plaster walls) might run the cost of a house above a strictly profit-yielding basis—yet tile proves extremely desirable in one's own house. So, too, with other things which could not be included in the landlord-owned house, owing to prohibitive cost. In a self-owned house they might be just the features which one most desires and without which one might almost as well continue to live in a rented house.

The true way to figure profit gained in selling one's own house is to include the amount of rent you would have paid living for the same length of time in a landlord-owned house as *part of the profit.* In other words, you have no right to expect to live *rent free*, even in your own house. If you paid $30 per month rent before building, charge yourself the same amount in the new home when figuring out the financial side of your problem. On this basis, if you sell the place in five years you should credit the investment with $1800 (five years at $360 per year) in addition to any other profit you may make. Of course, you should make some calculations for repairs and taxes, which the landlord paid formerly but which you are now required to pay yourself.

If the new home is more elaborate and expensive than the old one you should charge yourself increased rent—about what you would expect to pay for like accommodations. This is the only just way in which to estimate the financial returns from your investment.

But after the dollars-and-cents part of the project is threshed out and laid one side you should realize that other and greater considerations furnish, after all, the best reasons why folks desire to own their homes. Increased comfort and satisfaction, the safeguarding of family privacy and greater freedom for children (to say nothing of increased reputation for thrift and stability) are ideals every family should look forward to. These are facts correctly understood by all and there is hardly a family to be found in which the heads do not have a well-defined ambition some day to own their home.

For the young man and young woman home-building is particularly desirable. Building "on the installment plan" appeals to such as a safe way to invest surplus funds, however small. Young people who are paying for their homes in this way must of necessity be more cautious of expenditures in order to meet the payments required. They spend less on trivial things and this promotes thrift. Many now possessed of an abundance of this world's goods received their first start in this way.

Buying the Building Lot

To caution one in selecting the building site may seem unnecessary, yet so many mistakes in taking this first step have been made that it may not prove amiss to give a little advice here.

There are beautiful houses built in almost every part of the United States, homes containing every modern convenience for comfort, yet a substantial proportion of them are not what one might call really *successful*, because built on such undesirable sites. Of course, it is difficult to say offhand what is and what is not a "desirable" building site. One man might insist upon a hillside for his house, claiming that no other location is so desirable, while another might select a flat or undulating prairie. *This* house-owner prefers trees and plenty of them, while *that* owner, when he is in the market for a lot, specifies no, or few, trees, because "trees keep the place damp." A few general rules can be laid down, however, which apply in almost any section of the country and under practically all conditions.

Cost is, of course, the first consideration

and along the line of cost one must consider the seller—he from whom you buy. A seller may be the man who owns the property, or, as in many cases, he may merely be an agent empowered by the actual owner to sell or offer for sale.

Town and city property (or suburban property) is usually sold through an agent, a man skilled in the handling of property—one who is supposed, of course, to get the most advantageous terms possible for his principal, the landowner.

Every man and woman who has ever purchased goods of any description, especially those who have had experience in buying real estate, knows how quickly anything jumps in value as soon as some one wants to buy it. A piece of property may lie idle for years, far removed from transportation, town conveniences or other advantages which might seem to make the land desirable for home-building; such land might appear of little value, but let a prospective buyer signify his interest in it and, overnight, the price of the property jumps.

Buying real estate, improved or unimproved, is sometimes like buying a pig in a bag: you may get a fat pig, and then you may not, depending upon the man from whom you buy. The first rule I would lay down in buying property, then, is this: Deal only with a reliable seller. When an agent is employed by the property owner ("real-estate agent," he is called) be sure he is a man of reputation. Most agents are without doubt honorable men who would not knowingly misrepresent the value of property. However, any agent may be, to say the least, optimistic about land values. A man's reputation is his chief asset in any line of business. You have a right, then, to expect to deal with a man who has made a reputation and whose reputation is good.

When buying directly from a landowner you should expect the same square deal you would get from a reliable real-estate agent—that is, his statements should be absolutely honest and his valuation of the land should be fair and just. Of course, you ought to remember that the seller's idea of value and the buyer's are often at variance, the point of view of seller and buyer being naturally somewhat different. The man who owns property usually thinks it is worth more than the man who wants to buy. A little careful investigation will keep the buyer well informed, however. He can find out the selling-price of surrounding property, always remembering that a reasonable advance in value each year (as more and more houses are built in that locality) is to be expected. Indeed, a good yearly increase in valuation is desired as showing a healthy, "alive" tendency to the property, indicating that a wise investment can be made there.

In considering the cost of property

you should carefully examine surroundings. In a suburban locality or in town or city first see whether sewer, water and gas are already extended through the street. Next you should ascertain if the street has been "improved" and if sidewalks and curbs are in place. Naturally, if required to make these necessary improvements yourself you should find

out what they will cost and add this sum to the original cost of the property to find out the full amount the land will come to.

If these improvements are all in, and if all assessments for these improvements are paid (which you can ascertain by applying to the proper city, town or village official), the price of the land can be understood to cover improvements.

When building in the country

the problem, of course, is not quite the same. Probably there will be no gas, sewer or water pipes, and very likely there will be no curbs or sidewalks. Improvements such as septic sewage system, water supply and lighting plant will then become part of the new building operations. Walks and curbs will be left to the individual ideas of the newcomer, who may spend little or much on his improvements. On the other hand, his land costing much less, he should be willing to spend something for the health, comfort and safety of his family by putting in those modern conveniences now regarded as necessities—an abundant supply of pure water, an adequate system of scientific sewage disposal and electric or gas lighting plants.

Most-to-be-desired points in a building lot are well understood by the average buyer. All know that a high and dry lot is better than a low, damp one. Trees are usually considered as greatly enhancing the beauty of a piece of property, as well as increasing its market value. To those who are cranks for sunlight I can only observe that when trees are too plentiful a few near the house can be thinned out to let in sunlight, but I earnestly suggest that no trees be cut (except directly where the house is to stand) until the owner moves in and studies carefully just what trees should be cut down. It is better to have too many trees the first year than to sacrifice needlessly even one—and usually it takes about twelve months of actually living on a property before the family understands and can intelligently decide upon such intimate details as trees.

For the man who buys a treeless lot let me caution him in computing its total cost to include a sum for trees and shrubs which he must buy to make his property desirable. So many buyers forget this item—purchasing a bare site expensive to plant and improve, when perhaps at a slight advance over the bare lot (and for less than what improvements would cost) they might have secured a site well supplied with trees.

Then there is the item of grading to be taken into consideration. Whenever possible avoid a site which sets so low as to require expensive filling and grading. Dirt hauled to the site in carload lots may prove costly and any such grading should be considered and its cost computed before purchasing.

For those who buy in a suburban community

consideration should be given to the town itself, and to schools, churches and homes in the immediate neighborhood in which they propose to live. Taxes are of first importance to the future dweller, who will naturally wish to avoid settling in a community where taxes are out of all proportion to the advantages secured. Good schools will have paramount influence in the future development of the youngsters, who, after all,

should be considered more carefully in the new scheme than any other members of the family. An efficient fire department and abundant water supply mean better insurance rates and greater safety. Ample police protection is also, of course, desirable.

Churches—their general characteristics and location in relation to your property—may also influence you in buying. Transportation—proximity of railroad or trolley lines—means much to the suburbanite who must travel to and from the city each day. All these things are of interest to the prospective purchaser, and the details can be readily ascertained by a little quiet and skillful investigation. You may quickly size up the situation. The appearance of neighboring houses and grounds indicates the character of townspeople; a little thought will help you determine whether or not they would make desirable neighbors.

Beginning the Building Plans

Once a building site is selected and all points concerning the exact or approximate location of the house determined, the prospective owner and his family are ready to take up the most interesting part of the problem. For years, perhaps, ideas and ideals have been accumulating in their minds. New houses built in near-by as well as far-away towns have been noticed, and when it comes to the plan stage almost everybody has more or less definite notions about the kind of house wanted—the arrangement of rooms and general type. Members of the family have doubtless noted pleasing features in other people's houses. Magazine pictures and plans have been clipped and carefully preserved, and from this material many useful ideas are obtained.

Almost the first thing the prospective owner must decide upon is his architect—whether to have an architect or not. There are various opinions on this point, some claiming that an architect is necessary, others believing that the only way to get what you want is to make your own plans. Most people who have been through the building proposition and realize its many interesting though exacting problems concede that plans are necessary—the most accurate and best plans you can buy. Many owners who tried making their own plans and had unnecessarily annoying experiences believe that their troubles might have been partially or wholly escaped if they had used plans made by an expert. Other house-owners who dealt directly with contractors, using plans made by them (the contractors), have frequently found when too late that contractors wise in *construction* are not always expert when it comes to *designing and planning*. In other words, it usually takes an expert with wide training and experience to make satisfactory plans for a house. Contractors have not as a rule received just the right kind of training to fit them as designers. On the other hand, architects especially trained usually produce not only more beautiful homes, but also homes actually more practical.

Many get the idea that architects are mere artists. "They are not practical," you will hear it said. Contractors sometimes bring up this point, insisting that because they (contractors) have been building houses for, perhaps, twenty years they are more "practical" than architects. After unprejudiced investigation of plans produced by architects

and others produced by contractors (covering a period of many years), I can say without hesitation that in my estimation most architects' plans are very much more practical than builders' plans. Builders' plans may call for buildings that are sturdy and strong, but only too often there is waste of space. Then, the immature designer, as represented by the average contractor, is more or less inclined to "tack things on" in his zeal to get an architectural effect—features that are expensive and unnecessary. The skillful architect gets his architectural effect by the clever arrangement of walls, windows and roof, making needless the application of unnecessary ornamental features.

When it comes to planning

the new arrangement of rooms, an architect has a decided advantage, because he is usually more familiar with the problem of planning. Architects, in close touch with the work of others (as well as their own work), usually succeed in cleverly arranging space without waste. Having had so much experience, they know almost at a glance the arrangement of rooms which will yield the utmost comfort and convenience at minimum of cost, and they can tell by a little study the sort of house that will most likely fit the building site and prove most comfortable for the family.

Use plans by all means—well drawn, accurate plans prepared by an expert with a reputation sufficiently good to assure you of good results. In some instances, of course, you might make an advantageous deal with a contractor to make plans and build the house, but those who have tried it both ways are usually loud in their praise of the separate-plan method of building—that is, plans made by an architect. As a matter of fact, most people buy plans prepared by experts, so undoubtedly the larger number of house-owners know the value of good plans.

It only becomes necessary, then

to decide whom to employ as your architect. This is a vital proposition, almost as vital as choosing one's family doctor or one's legal adviser, as the architect is largely responsible for the success of the new home. No matter how expert the average house-owner becomes in his understanding of plans and specifications, he can rarely picture in his mind a house just as it will be when completed, and he must usually depend upon the judgment of his architect. With a wise architect behind your plans, you will have gone a very long way toward ultimate success.

There are two kinds of plans to be had

ready-made plans and plans *made to order*. Every owner must decide in advance which he will use. Advantages claimed for ready-made plans are that they are economical (because, having been built from many times, the actual cost of building is fairly well determined in advance), and often the actual house can be seen in duplicate in some near-by town. Then, ready-made plans are cheaper because architects producing them sell far and wide much in the same way that books are sold; therefore they can set a low price on each set of plans and still make a good profit.

In selecting ready-made plans you will have a wide range from which to choose. It should not be difficult to pick out the architect from whom to buy if he has been in business sufficiently long to give assurance of his stability. You might also require references, asking for names and addresses of people to whom he has sold plans.

Advertisements of architects dealing in ready-made plans are to be found in many magazines. Before the actual purchase of plans you can buy books showing on a small scale plans and exterior views of many of the houses.

Another method of securing ready-made plans has been introduced with much success by lumber and millwork dealers. Some of the larger concerns sell plans as low as one dollar, at the same time making you a price on all material required in the house (usually considerably below what you could buy material for from the ordinary retail lumber yard). One reason for the economy of this system is that all waste is eliminated. Material is provided in just the right quantities, lumber being furnished in proper lengths to fit. Then, windows and doors made by thousands are naturally cheaper, and one may expect to get material for houses (in wholesale lots like this) cheaper than material for houses built in the ordinary way. With most concerns the amount paid them for plans is refunded when they receive your order for material.

Claims made against *ready-made* plans are that the owner does not receive the individual consideration he gets when his plans are *made to order*. For instance, let us say that a ready-made-plan architect makes up a design for a $4000 house. He gets ready one hundred sets with specifications, all alike, and these are featured in his book of plans. From all parts of the country one hundred buyers purchase these plans and build duplicate houses. Now, the chances are that only a portion of these hundred buyers are exactly fitted by these plans. They selected this house because *it comes nearest to what they want*. If plans had been made to order they might have secured a house *precisely* as they wanted it, and in this case there would have been, possibly, one hundred different houses instead of one hundred duplicate houses.

Architects making plans to order also claim that the selection of ready-made plans is too much of a task for the average inexperienced owner. He (the owner) looks through plan books and views various designs, but how is he to know how to select the house which best fits his lot or which will cost least and make his family most comfortable?

Of course, ready-made-plan men make plans to order also, or they will change their "stock" plans to suit the ideas of the owner, but made-to-order architects insist that ready-made-plan men cannot give such satisfactory personal service as themselves, because the former sell each plan at a low price, depending upon a large output for their profit; they cannot, therefore, pay much attention to each problem and must leave most of the work to draftsmen.

Many prospective house-owners buy ready-made plans, and if they select with good judgment from reliable architects there is no reason why they should not get good results. If they choose to buy from a lumber or millwork concern the same applies—that is, they must select plans intelligently, dealing only with a reputable concern.

Other house-owners believe in plans made in the old-fashioned way, first by consulting an architect in their own town or in some city or town near by, and then having plans made to order under his skilled guidance.

Dealings with makers of ready-made plans are pretty well understood by most readers, so we will devote the rest of this discussion on plan-making to ordinary architects whose work is *made to order*—a system not quite so well understood by people who have never built.

Made-to-order plans.

When they call upon architects for the first time, many owners are not familiar with architectural practice. They don't know what made-to-order plans cost and they are not familiar with the duties of the architect—what he is supposed to do, and how far he is expected to safeguard the interests of his clients.

In selecting an architect to make your plans you should, of course, pick a man first whose experience in designing small houses leads you to think him capable and efficient along this line. Though it may appear strange to some, small-house designing is one of the most difficult branches of the profession. Architects most successful in this field are usually men who have had a wide experience in small houses. Men whose practice is largely devoted to public buildings, factories, warehouses and apartment buildings are rarely the best to employ in designing a little house in which every item of cost must be kept down to the minimum, every inch of space utilized and every architectural feature obtained at low cost. It requires not only brains to design a little house, but extraordinary skill and perseverance as well. This must be borne in mind when the owner selects his architect. He need not be surprised if asked to pay 10 per cent. for his architectural services (10 per cent. of the complete cost of the house), for the American Institute of Architects now recommends this as a just and proper fee for its members to charge for plans, specifications and supervision of a house costing less than $10,000. Thus, if your house costs $3000 you would be required to pay $300 for architect's services. This may seem a high price to some, but it is usually found worth while, as the skilled architect can most often save money in the long run. All architects do not charge the same fee, however, and you will find the price varies usually from 5 to 10 per cent. Architects when not required to supervise the construction of buildings usually charge from 2½ to 7 per cent. for plans and specifications.

An architect works in about the following manner: First, after consulting with you, to get all your ideas, he prepares a set of what are called *sketches*. These are drawings (on paper) of two floor plans with one or two exterior views entirely made up from the architect's ideas, or they may embody only your own ideas. Frequently sketches are worked up from a rough sketch which the owner has made himself. Usually these preliminary sketches embody the ideas of the owner as well as the architect, being the combined thoughts of both.

Then the owner receives and examines his sketches. He and his family thus have a preliminary suggestion for the house, showing its arrangement and exterior appearance. They can examine these sketches,

criticising them in detail, room by room. Perhaps the scheme does not prove entirely satisfactory the first time. The owner may require changes—indeed, sketches may have to be entirely redrawn before the design is satisafctory. When finally approved, however, the architect is ready to start working drawings and specifications.

Working drawings

are usually made in black ink on "tracing cloth," a sort of waxed, transparent linen. After working drawings are completed the owner most often looks them over before the several sets of "blue prints" are struck off for the various contractors who are to submit bids on the work. Working drawings are exact duplicates of the approved preliminary sketches, except that they are drawn more in detail, all dimensions being plainly marked and many notes added for instructing workmen. An ordinary set of working drawings includes a Basement Plan, First-Story Plan, Second-Story Plan and Attic Plan. Then there is an exterior view of each of the four sides of the building (called "elevations"), and, perhaps, a cross-section or two showing interior details. Frequently one or more sheets of details are included, showing window and door frames, cornices, cupboards and similar features. The idea is to have a drawing covering every portion of the building which the contractor must know about before he can intelligently estimate the cost. Later, after contracts are let, more details of construction and finish are usually furnished by the architect for the assistance of the workmen in building.

A set of specifications

is merely a sort of letter, many pages long, addressed to the contractor, explaining to him just how the house is to be built. Specifications sometimes consist of as many as forty or fifty pages of typewriting, telling all about the masonry of the house (foundations and chimney), the carpenter work, the plumbing and heating, painting and glazing, plastering, electric work, and so on. The specifications, together with the plans, are supposed to cover the entire building of the house, so that the contractor can, in the first place, tell in advance precisely what the house will cost, and afterwards accurately build it as indicated in the plans and specifications.

Thus plans are a sort of pattern from which the house is built, and the specifications are typewritten instructions explaining how to use the pattern and telling what kinds of material are to be employed. In order to avoid later disappointments, the owner and his family should study plans and specifications carefully before the house is started. In a good set of plans every item of the future house is forecast so that the owner can know just what he will get.

When working drawings (plans) with their accompanying specifications are completed and approved by the owner his architect is ready to take bids. As it is impracticable for a number of contractors to borrow the single set of original drawings and specifications from which to make their bids, it is customary for the architect to make a number of sets of "blue prints," so that each contractor can have a set to use at this time. Blue prints are exact duplicates of the original plans. Most people are familiar with them.

Taking Bids

Whenever you start to consider plans and specifications for the new house (and this start should be made as many weeks as possible before completed working drawings will be needed, in order to allow the architect sufficient time) you should realize that *several more weeks will be required* after drawings are completed and blue prints made for "taking bids." Of course, many houses are built by what is known as "day's work." That is to say, no competitive bids are taken, but a contractor is selected who charges for material and the labor of his men—actual cost plus a percentage of profit. This is an excellent way to build, but, unfortunately, most owners are required to take competitive bids because usually a house costs so much less this way.

The justice of the "day's-work" method lies in the fact that an owner gets precisely what he pays for. There is no disposition on the part of a contractor to "skimp" on work or slyly evade any items in the specifications, since the owner pays for all. A disadvantage to the owner is that he doesn't know in advance of building operations just what his house will cost.

For instance, let us suppose an owner decides to have his acquaintance, Mr. Jones, build a house "by the day." Jones states that he supposes the work will cost "somewhere in the neighborhood of $3000"—all of which seems about right to the owner. Construction of the house proceeds, and as fast as bills for labor and material come in the owner pays. Finally the allotted $3000 is gone—and yet the house is not completed. Jones evidently made a poor guess when he said the work could be done for $3000. Perhaps before they get through another $1000 will be required, and the owner finds he has a $4000 house instead of a $3000 house.

To be sure, the house may be worth all the owner pays for it. Every bill might be absolutely correct and the contractor entirely honorable, yet the owner has put more into his house than he anticipated. If he had known in advance that the building would run to $4000 he might have reduced its size or left out some of the luxuries in order to get down to a $3000 cost.

To the prospective owner of the average small house I would say, by all means build under the "contract method." That is, take competitive bids and "let" the job to one of the bidders (usually the lowest) at a stated contract price. Then you will know in advance what your building will cost complete.

Even under contract a house can easily overrun the contract price if you keep making changes or adding "extras" during the process of building, but you will at least have the project in your own hands to increase its cost or not, as you see fit. Also, you must beware under the contract method that you or your architect does not forget to include everything needed in the plans and specifications, or you may discover, as one man did not many years ago, that the staircase has been forgotten, or a chimney or some other vital part of the house which must be added to make the house complete. Then, naturally, there will be an unavoidable "extra."

When you employ an architect who takes bids (and here is another advantage in having an architect) he will select contractors in various lines to bid on your job. Perhaps he will invite half a dozen in each field (six masons, six carpenters and the same number of plumbers, painters, plasterers and electricians) to figure on the work. Each is permitted to borrow a set of blue prints and specifications, which he keeps a few days and then returns with his bid. The average bid reads about as follows:

> I hereby agree to furnish and erect all carpenter work on the J. J. Smith residence at Lynn, Massachusetts, according to plans and specifications furnished by Wells & Moulton, Architects, for the sum of $1927.
>
> (Signed) J. J. Slack.

Each of the bidders

returns a bid similarly worded, and you thus have half a dozen bids from each trade. Upon comparing notes you will probably find the amounts of bids vary in a surprising way. Though each man has precisely the same plans and specifications to figure from, one bid may be $1927 and another $2800. By adding up the lowest bids for each trade an owner can see what the entire house will cost.

Sometimes the lowest bids are not accepted. One man whose bid may be a few dollars higher than the lowest might seem so much more desirable as a contractor that the owner decides to employ him, even at an increased cost.

The ethics of taking bids do not require an owner to "let" the job necessarily to the lowest bidder, provided the specifications contain a clause similar to the following:

> The owner reserves the right to reject any or all bids.

Every contractor understands when he sees this note that even though he may be lowest bidder the owner can give the job to a higher (or even the highest) bidder.

In spite of this clause, however, it is the general custom to give a job to the lowest bidder. It is assumed that every builder invited to bid is first class and each would be satisfactory as a contractor. With only first-class builders invited the owner can in all fairness award a contract to the lowest.

Taking separate bids, as explained above, is recommended for small houses, because it usually saves money for the owner, though not what might be considered the most ideal way for this reason: When a single *general contract* is let to *one* man (including masonry, carpentry, plumbing heating, painting, and so on) you have but a *single individual* to deal with. If things go wrong (and often they do, you know) *one* man is responsible—the *general contractor*. When *separate contracts* are let (carpentry to Jones, plumbing to Smith, plastering to Brown, and so on) you have a number of men to deal with. In the latter event it will be up

to you or your architect to see that each trade sends its workmen to the job promptly. When masons are through with the foundations you must see that the carpenters go to the job. When the carpentry is sufficiently advanced you must get the plumber at work, and so on. Thus there is an endless amount of detail put upon your shoulders which might be escaped if a single *general contract* was let for the entire job (in which case the general contractor is obliged to see that all trades are working efficiently).

A general contract usually costs more

than *separate contracts*, because the general contractor requires a percentage of profit from each of the various trades coming under his supervision, so his single general bid is that much higher. When separate contracts are let this tax is eliminated.

As I have stated before, an architect is particularly useful when it comes to taking bids. Usually he knows from experience which contractors are most reliable. He also understands what small houses cost, and will most likely be careful in drawing plans not to overrun the appropriation. During the process of taking bids he will follow up contractors to see that their bids are sent promptly—all of which saves time and permits a building to be started that much sooner. Usually complete separate bids for a small house can hardly be received under two weeks from the time blue prints and specifications are ready. Sometimes it takes much longer, depending upon the number of bids taken and the rapidity with which contractors send them in.

To an experienced architect the bids on a building convey considerable information. For instance, he can usually tell which bids are too high and which too low. The highest, he may suspect, has been made purposely high because for some reason or other that particular contractor doesn't want this job; building ethics requiring him to submit a bid of some kind, he puts on an unreasonably high price, knowing there is no danger he will be awarded the contract. Then frequently the lowest bidder is too low; the architect realizes it would be impossible for a contractor to build at that price and come out whole. Perhaps the man has made a mistake, as is frequently the case. Of course, if a man makes a bid in good faith, signs the contract and goes ahead with the work, he (the contractor) must stand the loss if the building costs more than he figured. However, it is always unsatisfactory to the owner when a contractor loses money on a job. No matter how honorable a builder may be or how carefully he intends to follow plans and specifications, upon realizing he is losing money a builder becomes disheartened and there is a disposition to "skin" the job in order to reduce losses as much as possible.

Every reputable builder is worth his hire. He should be permitted to make a reasonable profit—which is to the owner's interest. Owners sometimes go so far as to hand the contractor a cash bonus at the end of a job when they realize he has lost money.

The best contractor

he with whom you prefer to deal, may be not the lowest bidder nor the highest. You want a man who has the reputation of being *absolutely*

square; one who is efficient and will keep things going at a lively pace; one who employs only the highest grade of workmen. If you don't know about the contractor yourself it is to be hoped your architect is better informed, for a poor contractor will most assuredly get poor results. No matter how carefully you or your architect watch the work, *some* poor work will be slipped in somewhere, causing trouble later.

Then, too, you need a man with a pleasant disposition, for you should remember your contact with him will be almost daily for many weeks. There are annoyances (and plenty of them) when building a little house, but there will be much less friction when you deal with a pleasant, gentlemanly builder who is as anxious to keep everything straightened out as you are yourself.

Some contractors—not many of them, however—are cranky. Honest enough they may be, but it is hard to do business with them because their feelings are so easily ruffled. Then sometimes a contractor is not in sympathy with what you are trying to do, and you feel that all he wants is to get through as quickly as possible and receive his money.

Most builders have a reputation of some sort, and it is easy to find out about them before starting—a very desirable thing to do if you would save trouble later.

Letting Contracts

A contract is the contractor's promise to do certain work for which you (the owner) agree to pay a specified price. Contracts are usually printed forms, with blank spaces for filling in with writing or typewriting. When you have an architect he will prepare the contracts—two for each trade represented (one for you and a duplicate for the contractor). When you have no architect it is better to have a lawyer make out your contracts if you have had no experience in this line.

Briefly, the contract states that John Jones, Party of the First Part (Contractor), agrees to perform certain labor and furnish certain materials for the Carpenter Work (let us say) in a house to be erected in Philadelphia, Pennsylvania, according to plans and specifications furnished by Smith & Hicks, Architects, and under their supervision.

Charles Bates, Party of the Second Part (Owner), agrees to pay certain sums for said work, provided all labor and material are as set forth in plans and specifications. The time when payments are due is stated, and further items concerning insurance, progress of the work, quality of workmanship, and the like.

After the owner and contractor have signed their names at the bottom of each of the two contracts a contract is legally operative. John Jones must then proceed to build the house and Charles Bates must make his payments at the times mentioned. Of course, when separate contracts are let there must be a set of two for each trade involved (mason work, carpenter work, painting, heating, plumbing, plastering, electric work, and so on).

Under an architect's or lawyer's direction contracts are most easily drawn up and the owner does not need to be cautioned particularly. If he purchases printed contract forms himself he may be somewhat embarrassed to know which to pick out, as many are published, all worded

differently. In the interests of *builders* several forms are printed which appear to give to *builders* the best of the bargain, then again there are forms which seem unduly to favor the *owner* (or his agent, the *architect*). Owners should read carefully such forms as they have under consideration and see that there are no general clauses included leaving the decision of some important matter to the contractor, or which leave too many things to be determined by "arbitration." Plans, specifications and contracts should be so plain in every item as to admit of no dispute. With an architect on the job—a fair-minded, honorable judge—decision on any points brought up by the contractor should be satisfactory to all parties without the necessity of an arbitration committee.

Many architects have their own printed forms of contracts, forms which are the result of many years' experience, embodying the latest and best practice protecting equally the interests of contractor and owner. These are the ideal contracts—impartially fair to both parties. When owners and contractors operate under them all or most of those vexatious disputes which are sometimes the bane of building are eliminated.

A good building contract

states specifically the duties of the contractor, the owner and the architect. That is, the contractor is to do careful work, the owner is to furnish certain money and the architect is to furnish plans and specifications and supervise the construction of the building. In the latter capacity an architect, of course, acts as the owner's agent, and the owner must be responsible for what his architect orders.

Sometimes trouble is caused by some of the parties to a contract not knowing what their duties are. For instance, the architect may visit a job (in the interests of his client)and give certain directions. Perhaps a short time afterwards the owner goes to the building and orders changes made at variance with what the architect has instructed. Strange to say, the orders of an architect carry above the orders of the owner himself. If an owner wishes to give instructions he should inform his architect and arrange to have the latter give orders to the contractor. Frequently some annoyance is caused by misunderstanding this little point. Of course, if the owner is his own building superintendent he issues his own orders.

When contracts are signed it is a wise plan to have every contractor write his name on several of the sheets of plans and in one copy (at least) of the specifications; you should sign them also yourself. This is in order to "identify" plans and specifications in the event of a suit in court. No owner likes to contemplate a possible lawsuit in connection with his building operations. Most men would refuse to build homes if they thought themselves liable later to a lawsuit. With a good set of plans and specifications and a disposition to be fair on the part of owner as well as contractor no lawsuit need be feared; at the same time, suits to interpret building contracts have occurred in the past and probably may occur again, so the owner should be sure that his building contract will "hold water" in court. About the first thing necessary to prove in court is that the plans and specifications exhibited are the "identical instruments" which are part of the original contract, and that no pen-and-ink or typewritten changes have been made. For this reason the signatures of owner

and contractor on plans and specifications are a great help, proving beyond doubt that they are the original documents.

As every one knows, there are stories abroad (more or less jokes) that all house-owners come to grief over cost of building. "Look out for extras!" is the cry. In a building contract (or in the specifications) some clause should be included stating that "no extras will be honored by the owner unless ordered in writing and signed by the architect (or owner)." It is so easy to say to a contractor as the building proceeds, "Make that room a little larger," or "Add another window in that room." The builder follows instructions, and when the job is done there is a long bill for "extras," many of which the owner has forgotten. He is appalled to find they make an almost annihilating attack upon his bank account.

Requirement of written orders

for extras should be plainly noted in the contracts, *then* if an owner or architect writes a letter of instructions "in cold blood" there will be no doubt about it at the wind-up of the job. It is always better when ordering extra work in this way to have entered in the order an agreed-upon price for the work. Thus, when ordering an extra bay window have the contractor give you a price for the work before you instruct him to go ahead. Thus you know in advance what will be charged and can govern yourself accordingly. With a carbon copy of every "extra" ordered the owner can always keep track of the final total cost of his building and he will know just how much money will be required upon completion.

The ideal way is to have no "extras." Get everything in your plans before starting to build. Examine every inch of the drawings and specifications, making sure that they are just what are wanted before even taking bids. Then, once a contract is let, *make no changes*. This is the most practical method of building; few follow it, I regret to say. No matter how much we study plans, once a building is under construction and we see with our eyes the actual size and arrangement of rooms we long to change them. Nevertheless, the rule holds good: *Don't make changes as you go along*. If you *must* make changes, however, make as few as possible and weigh them well before you make them. Above all things have any changes ordered taken care of by written or typewritten letters with the amount of cost entered beyond all dispute.

Before starting on a building proposition every owner should get a blank book or ledger and tabulate each item of cost as he goes along. For instance, first enter the contract prices of the house. Then enter every written order as fast as issued. Payments made to contractors from time to time should also be noted, so the owner knows at a glance just what sums he has paid and how much will be due in later payments.

Architects usually keep a ledger in like manner, and the owner's building accounts should, therefore, check up with the architect's.

How to Build a Frame House

No part of the house should be more rigidly designed and constructed than the foundation walls, for dependent upon their strength and endurance is the durability of the entire building. There are many excellent

materials for foundations, but it will be wisdom on the part of the owner to select that which is cheapest in the particular locality in which he is building. For instance, near a source of stone supply stone foundations may be cheapest and most satisfactory. Away from that portion of the country where stone abounds cement concrete might prove cheapest and best. Then there are hollow tile (excellent for foundations) and brick (when very hard and dense).

These are all good materials. The owner can readily find out which will prove most economical for his house by inquiring of local builders.

Each building material used for foundations has its own friends, but the majority of architects and builders have come to the conclusion that cement concrete, stone, tile and brick are all good for the purpose, and the selection of any one of them should be governed by price.

In a locality where all materials abound, comparative cost is about as follows:

Comparative Cost of Foundation Materials

(1) Concrete blocks, solid concrete or clay tile.
(2) Brick.
(3) Stone.

(N. B.) Cost of these materials, of course, varies in different localities, but it will be often found, as stated above, that concrete blocks, solid concrete, and clay tile are about the same price, though in some localities clay tile costs more.

Before plans are made the prospective owner must decide whether he prefers a house built of masonry or the ordinary wooden-frame house. These are the two general types of houses—masonry and frame. Steel (and steel-frame houses) are occasionally built, but they are so rare in America it will not be necessary to consider them here.

By far the great majority of houses are of wood. Not because wood is better than brick, tile, cement or stone, but because it is cheaper. Though price of lumber is much higher than a few years ago and frame houses cost in some instances twice as much as they did in the early '90s, lumber is still cheaper than masonry materials—that is, *cheaper as to first cost.* No matter how much the builder of a little house may desire to use brick, hollow tile or concrete, he must understand that his building appropriation will go considerably farther in frame construction. In other words, with a limited expenditure of, say, $3000 or $4000 (or even more) he can get a larger building for the money in frame than in masonry.

Besides economy of first cost many other advantages are claimed for frame construction. In the first place, a wooden house permits of wide variety in color effects: on the shingled house stains of every color, ranging through brown, green, red or yellow, giving charming effects when used with good taste; on the house covered with clapboards or siding paint of any hue can be used.

Then there is the ease and dispatch with which a frame house goes up, frame construction requiring less time than masonry construction. Claims are also made that frame houses are less damp than brick houses.

Of course, exponents of masonry have claims which they make concerning their types of construction, also, and the prospective house-owner

will do well to listen to both sides of the story before deciding upon his material.

In building a frame house

the idea to bear mostly in mind is to secure *well-seasoned* lumber, most of which nowadays is of hemlock, spruce, fir and pine (the latter usually Northern, Southern or Western pine.) Hemlock is not the best wood to use in the framework of a house. Spruce will do very well when well seasoned.

Among the woods now used extensively for framing and interior finish some mention should be made of fir (often called Douglas fir). Fir makes excellent wood for studding and floor beams. It also makes a good and inexpensive interior finish, as the grain is very attractive when stained. Fir is also used for porch floors.

In the average carload of lumber hemlock, spruce and pine (not "white" pine) are usually mixed together and one is obliged to take what one can get. You can at least, however, insist upon "seasoned" lumber—that is, lumber that has been piled outdoors in a lumber yard for several months, permitting air to circulate through it and dry out the sap always present in wood freshly cut. While lumber is drying it shrinks, and that is what you require—all boards properly shrunk, so that when used in building they will not shrink further and cause cracks in plaster and woodwork. Unlike finishing lumber (such as is used for window-casing, base-boards and finished flooring), rough lumber used for the framework of a house should never be kiln dried.

There are several ways to build the wooden framework of a house, though all might be divided into two general types of construction—"*framed*" framing (if such an incongruous term may be permitted) and *balloon framing*. The former is a method usually employed in the East and South and the latter is chiefly used in the West. Some characteristics of the former type are upright studs and posts fastened to a horizontal sill by means of "mortise-and-tenon" joints (the studs are said to be "framed" into the sill), consisting of square holes (mortises) cut in the sill to receive the square stems (tenons) cut on the ends of the studs. Then there are other features of the Eastern frame, such as heavy horizontal supporting timbers (girt) under second-story floor joists and diagonal wind braces at the corner posts, with the result that the entire framework is a most substantial unit of construction that would stand until the end of time if it did not decay.

Balloon framing, as practiced in the West, usually consists of a cheaper method in which most of the timbers are smaller in size and secured by means of spikes instead of mortises and tenons. Instead of a heavy girt under second-floor joists a light inch plank is used (called "ledger"). Then as a rule diagonal wind braces are omitted.

It would seem that the balloon frame is less substantial than old-fashioned mortise-and-tenon framing; however, thousands of houses are built this way and prove entirely satisfactory. With timbers of good quality, properly spiked, there is no doubt that the balloon frame is quite satisfactory and usually costs less than more elaborate construction.

The discreet house-owner will do well to follow the method of framing in vogue in his locality, as he can usually get best results by using a type

of construction with which local builders are most familiar, thus avoiding unnecessary complications.

The framework of a house
is usually boarded over on the outside with matched boards, which are in turn covered with a thickness of building paper fitted tightly around window and door openings. Building paper is really of great importance, for it is this paper skin which keeps out wind. As every one knows, it isn't the low temperature of winter that makes rooms cold so much as it is the pressure of icy winds seeking out every crack and crevice in the building, and through them entering to produce those frigid "drafts" with which we are all unfortunately so familiar. Watch thoroughly, then, during the process of building and see that building paper covers every portion of the outside walls. Permit no cracks, however small, to remain uncovered (frequently overlooked by careless workmen).

Next after building paper comes the exterior "weather boarding" (as it is called). This may consist of shingles or ordinary siding (the latter often called "clapboards"). Since this exterior covering is the part that must withstand weather and upon which the durabliity of your house depends, you will naturally select the kind of material from which it is made, wisely. White pine and cypress are the two woods most generally used for exterior finish (for siding as well as window-frames and cornices). Within a few years "Western" pine has come into the market for this purpose, and quite recently "gum" wood has been used for siding. You must depend upon the advice of your architect or your lumber dealer when it comes to selecting the proper kind of wood for exterior finish. White pine and cypress are undoubtedly the most permanent, though they are not by any means the cheapest when it comes to first cost.

On the Pacific Coast "redwood" makes an excellent exterior (and interior) finish. It is not generally used in many other markets, however.

Brick-veneered houses
as ordinarily built are regular frame houses with an outside veneering of brick, four inches thick. In these houses the boarding is covered with waterproof paper, just as in any frame house. Spikes are driven into the boarding and permitted to stick out sufficiently to bond with the brick which are laid by the masons. Upon completion a brick-veneered house looks like a solid brick house.

For the roof there are wooden shingles consisting of pine, white and red cedar and redwood; then there are various brands of what are known as "composition" shingles, a material consisting of several layers of asphalted felt or burlap to which is fixed an exterior surface of crushed stone, ground slate or ground tile. These come usually in four colors, "natural" (stone), "green," "blue" (slate) and "red" (tile). Composition (sometimes called "asphalt") shingles are excellent where a light, attractive, economical roof is wanted. Usually they are warranted for ten years by the manufacturer—considerably longer than the warrant given for an ordinary shingle roof. Many claim composition shingles will wear longer than ten years.

Several other kinds of roofing materials are in the market, many consisting of felt or a heavy paper substance made in layers with oils, wax or

pitch, under enormous hydraulic pressure to produce a tough, weather-resisting roof. Most of them can be secured in a number of colors, some in rolls and some in large sheets. As such they are even more economical to lay than individual shingles, for the labor cost is less. In buying roofing materials of this kind it is best to patronize only a concern of known reputation; one that will stand behind its product and upon whose claim you may absolutely depend. It is comparatively easy to ascertain from manufacturers where their goods have been used and with what results.

To the builder of the little house who desires a permanent roof there are several excellent materials, most of them well known. Asbestos shingles are enduring, light in weight and attractive. They can be had in natural (gray) and several other colors—notably red. Slate has been used so much that all are familiar with it. "Blue" slate and "green" slate are the more ordinary colors, though "red" is sometimes used. Tiles made of clay make excellent roofs, the prevailing colors being red and green; then there are tiles made of cement, which can be had in many colors and in "natural" (gray).

All these materials are satisfactory and the house-owner will have no difficulty in selecting that which he considers best for his house. The cost is about in the following order, the first being cheapest and the last most dear (bearing in mind that prices vary in different sections of the country):

(1) Wood shingles.

(2) Composition sheet roofing (in some sections this costs less than wood shingles).

(3) Composition shingles (often about the price of wood shingles).

(4) Asbestos shingles.

(5) Slate.

(6) Cement tile.

(7) Clay tile.

N. B.—In many towns there is hardly any difference in cost between some of the materials mentioned above. For instance, asbestos shingles and slate are frequently alike in price.

The kind of nails used for applying your roofing is of quite as much importance as the material. No matter how enduring the latter is, it will last only as long as the nails. Copper nails (copper-plated or "copper-clad") are, of course, most permanent. Next to these come galvanized-iron nails. In the cheaper work the latter are usually specified and the former are most often used on more expensive roofs, such as asbestos, slate or tile.

Also the metal work of a roof (gutters, valleys, hips and ridges) must be carefully planned to make a good, tight, weather-resisting shelter. Copper is best, tin and galvanized iron are next best. When tin is to be used specify some well-known brand with the maker's name stamped legibly on each sheet. Then you will have behind your roof a manufacturer bound to maintain the quality of his product.

Cement-Plastered Exteriors

An excellent material for covering the exterior of frame (or masonry) houses is cement plaster, sometimes popularly known as "stucco." Many seeing these houses for the first time think they are of masonry construction. Often prospective house-owners are surprised to find that the "stucco"

house they have in mind to build is merely of frame construction covered with cement plaster.

In the first stages a frame house to be plastered is built precisely like any ordinary frame house—that is, on a masonry foundation a sill is laid, to which the open framework of timber is secured, the entire frame then being boarded over on the outside with matched boards. Then comes building paper, which in a plaster house usually consists of heavier material than that required for the ordinary house. Waterproof felt is mostly preferred, and it is well to get a specific brand that has been proved by the test of time.

After building paper is secured there are two general methods of lathing—one, metal lathing on wood or metal-furring strips, and the other, wood lathing on wood-furring strips. Each method has its own enthusiastic supporters. Both ways are successful when the lathing is properly applied. Probably the majority of architects having the widest experience use metal lathing, the idea being that wood laths might swell slightly in wet weather, shrinking again in dry weather, all of which is liable to crack the plaster. Metal lathing of the proper sort does not change.

To prepare for metal lathing

nail to the outside walls of the building vertical furring strips of wood or metal, about twelve inches apart. To these strips metal lathing is nailed. Metal lathing should be a specified brand of *galvanized* (or paint-dipped) lathing. It is necessary to use galvanized or painted lathing to prevent disintegration from rust later, as ordinary cement plaster is not entirely waterproof and dampness will attack unprotected metal. Naturally, metal lathing should also be applied with galvanized-iron staples. There are many reliable brands of metal lathing to use and you will have no difficulty in selecting one made by a manufacturer of good reputation.

When wood laths are used

they should be narrow (1-inch) laths (ordinary inside laths are 1½ inches wide) well applied at least half an inch apart. Indeed, many architects recommend five-eighths to three-quarters of an inch apart for wood laths, so the plaster will flow into the interstices between laths and grip firmly. Many plastering contractors dislike to apply wood laths so wide open, as much more mortar is required this way. To secure the best job you should insist upon wide gaps between laths, however.

Once metal or wood laths have been applied the building is ready for its exterior finish of cement plaster (popularly known as "stucco"), usually about half an inch thick and applied in two or three coats. First a coat of mortar is used "pushed" firmly against the laths so that it will flow through the openings and grip. This coat is usually left rough and allowed to become hard, after which it is followed up with a somewhat smoother coat; then the final finishing coat is applied.

For those who prefer a rough-looking finish, called "rough cast," small-sized crushed stone is mixed with the mortar in the final coat of plaster. Then the material is thrown ("cast") against the groundwork of previous plaster, leaving a coarse, stony surface. To those who prefer

a smoother finish what is known as "sand finish" is applied. Sand finish is a final coat of mortar in which is mixed coarse sand. It is applied in the ordinary way with trowels. After application, when the plaster has lightly stiffened it is scoured with wooden trowels, slightly tearing it and producing that medium surface so pleasing. Rough cast is the most enduring of these finishes, however, because of the tough weather-resisting finish secured by means of crushed stone imbedded in cement.

Many architects prefer to use

a specified brand of rough cast made by some reliable manufacturer who ships his material in bags ready to use (upon merely adding water). An advantage in using ready-prepared material lies in the fact that it is usually machine-mixed accurately according to some formula, and you need not then depend upon the vagaries of your plastering contractor, who might make a mistake in his self-mixed ingredients. Another advantage in the prepared plaster is the facility with which one may choose any particular color or texture from a manufacturer's sample panels—and the assurance that the contractor will produce a finish that exactly matches the sample.

The proportionate cost of different exterior finishes for a frame house is about in the following order, though you should remember that, cost of materials varying in different sections of the country, this table cannot be accepted as applying everywhere:

Comparative Cost of Various Exterior Finishes

(1) Clapboards or siding.
(2) Shingles.
(3) Sand-finish cement plaster (self-prepared).
(4) Rough-cast cement plaster (self-prepared).
(5) Rough-cast cement plaster (manufacturers' brand).
(6) Brick veneer.

Masonry Houses

Many do not care to build a frame house, claiming that houses of masonry are more enduring and thus the increased cost of a masonry house is more than offset by the permanency of masonry construction. Then particularly in brick houses there is opportunity to secure architectural effects impossible with a frame house.

The most used materials for masonry houses are hollow tile, hollow concrete blocks, solid concrete, brick and stone. All of these are enduring, and, properly employed, secure a building that should last for years without repairs.

Hollow tile is usually made of clay, hard burned in a kiln until it becomes so dense that practically no dampness can be absorbed by it This is one way to test hollow tile for density: Pour a few drops of water on the surface; if it soaks in quickly you may know the material is soft and inferior.

As usually manufactured hollow tile for masonry walls are 8 inches by 12 inches by 12 inches, and 12 inches by 12 inches by 12 inches, the former making a wall 8 inches thick and the latter a 12-inch wall. In

most little houses 8-inch exterior walls are sufficient on the first story as well as the second story. For interior partitions tile may be as thin as 3 inches.

Most hollow-tile houses are faced on the outside with cement plaster (precisely like frame "stucco" houses). To secure a good bond between tile and plaster the former are made with deep grooves cast in them. Thus a house with tile made for exterior plaster shows deep grooves all over its exterior surface. When cement plaster is applied it flows into these grooves and grips much in the same way that plaster flows between laths and grips. There are several brands of hollow tile in the market, some made to stand on edge and some to be laid sidewise. The former are most extensively used. Correspondence with any reliable manufacturer will inform the owner as to the proper kind of tile for his job.

Hollow tile have also been made of cement pressed under great hydraulic pressure into tough satisfactory building units, somewhat larger in size than clay hollow tile.

Hollow concrete blocks are too well known to require explanation here. They can be had in all sizes, with many different exterior surfaces, smooth or rough. In many blocks surfaces are finished with crushed granite, producing the effect of stone. Other blocks are left rough, to be plastered on the outside, producing an ordinary "stucco" house.

Solid "cast-concrete" houses have been built by erecting molds on both sides of each wall and then "pouring" in concrete. Once the material has hardened walls are as though carved out of solid stone. Work of this character is more practical when cast "hollow." That is, some system of molds is used ("forms," they are called) which permits a hollow air space in the center of the wall—quite necessary to prevent dampness from soaking straight through the wall in rainy weather. Solid walls (without an air space) are usually cold in winter and hot in summer, a result which can be largely improved when a hollow air space in the interior is provided. In purchasing concrete blocks or in building solid concrete walls be sure the material is prepared by expert workmen only, as poor concrete is unsatisfactory.

Most builders of little houses

are familiar with brick and know in a general way how brick houses are built. Modern brick houses are quite different from old-fashioned ones, however, as many improvements in brick construction have recently been introduced.

In the first place, desirable "hollow-wall" houses are now possible in brick by the use of hollow tile for backing up the wall. To speak more correctly, hollow-tile houses are built faced with brick on the outside. Thus you have the advantage of the hollow wall in a brick house at no increased cost over an old-fashioned solid wall. Building in this way, the tile are laid up just as when building for a cement-plastered house, but little bands of galvanized iron (called "wall ties") are left sticking out from the joints of tile. Then the bricklayers build up an outside skin of brickwork (one brick in thickness, 4 inches), building in the metal wall ties. The result is a secure, firm, enduring wall of tile on the inside and brick on the outside.

Another great advance in brick houses has been made possible by improvements in manufacture. Rough-faced brick, making possible beautiful effects unknown to old-time architects and builders, are now manufactured everywhere. The first of these desirable brick to appear were known as "tapestry" brick, and they continue to be marketed under that name, though other manufacturers of rough-faced brick or "texture" brick use different names for their brands.

Stone houses are rarest of all, though many are built in sections of the country where stone is plentiful and cheap. Use only *sound* stone taken from deep in the ledge below the stratum of "rotten" or soft stone which usually lies near the surface of the ground. Any inexperienced house-owner can judge of stone by picking up a small piece in the hands and sounding it with a hammer. Soft, inferior stone crumbles under this test.

Fireproof Houses

Many architects making a specialty of designing houses are very much impressed with the desirability of building them fireproof. They reason that when one is spending several thousands of dollars for a house one might as well go a little beyond this and make the building absolutely or practically indestructible, using fireproof material for interior partitions and floors as well as for exterior walls. Of course, any masonry material, such as concrete, stone, hollow tile or brick, is more or less fireproof, and any of these can be employed for exterior walls. For floors and interior partitions concrete or hollow tile is used; often both are employed in the same building, for many systems of fireproof floors consist of concrete and hollow tile combined.

Strictly speaking, the ordinary "fireproof" house is not so fire-resisting as, say, an office building containing metal doors and wire-glass windows. Metal doors and wire-glass (fireproof) windows are hardly practicable for the average house, however, owing to the great expenditure they would involve, but the term "fireproof" is now pretty generally considered to cover the average house in which walls, floors and interior partitions are built of masonry, though wooden doors and ordinary windows may be used. Best houses of this class, however, have supporting slabs of fireproof construction under all staircases, though the steps themselves may be of wood.

Note the comparative cost

of various types of house construction contained in the following table (the reader should understand that no definite statement as to cost will accurately cover conditions in every part of the country). To ascertain accurate cost of various types of houses it is always best to talk with local builders or architects familiar with local prices and customs:

Comparative Cost of Various Types of Houses

(1) Frame.
(2) Frame, cement-plastered.
(3) Frame, brick-veneered.
(4) Cement blocks, cement-plastered; Hollow tile, cement-plastered.
(5) Hollow tile, brick-veneered.
(6) Solid brick.
(7) Stone.
(8) Fireproof.

Finishing the Interior

Well in advance of preparing actual specifications the architect will require the owner to settle upon the kind of interior finish required—what woods will be employed for floors and interior trim, and what kind of paint or stain is to be used. All this information should, of course, be incorporated in the original specifications, so that contractors who bid on the job will know what they are figuring on.

The kinds of wood most prevalent

in any locality are usually the most economical to use, though many of these may be shipped from a distance. As a general thing, house-owners can find in neighboring houses recently built a practical illustration of various kinds of wood. Dealers advertising gum wood, cypress, yellow pine, white pine, oak and other woods offer free information, and samples can be obtained from them. Cost of the various woods are about in the following proportion, though there is considerable fluctuation in prices taken in different towns. The reader will do well to take prices in his own locality:

(1) Yellow pine (sometimes called "Southern" pine)
(2) Gumwood.
(3) Fir, Cypress.
(4) Birch.
(5) Maple.
(6) Oak, chestnut, walnut and other unusual woods.
(7) White pine.

N. B.—On the Pacific Coast "redwood" is cheap and effective.

It will be seen by reference to this table that ordinary soft white pine, formerly the cheap wood used in kitchens and service quarters, is now even more costly than oak (in most markets), as the supply of pine is now, unfortunately, very much depleted.

In finishing a little house

except on the Pacific Coast, yellow pine, gumwood, cypress, birch and oak are the most popular woods in many sections of the country. Any one of these can be used throughout the house or many different woods can be employed, one kind in one room and another kind elsewhere.

When yellow pine is used it is ordinarily finished with oil, shellac, varnish, wax, or stain (not painted). Many delightful tints can be secured with stain or wood dye—greens, browns, grays or reds. They may be purchased ready mixed from manufacturers. All makers of stains have sample color-cards which they usually send direct to the house-owner, or he may see them at his paint dealer's. Many concerns maintain elaborate house-decorating departments for the convenience of owners and architects. Advice on all points connected with the use of paint or stain is freely given. Many magazines have departments conducted by experts, from which the owner can get any information required.

Gumwood makes an excellent interior finish when stained or merely waxed. Any shade of brown seems to bring out the grain of gumwood best, though gumwood is extremely decorative and can be stained or painted any color at will.

Fir and cypress can be either stained or painted, and the same may be said of birch, which takes stain readily and is often painted. In fact, birch, being a close-grained hardwood, is excellent for enameling.

Oak is generally stained or merely waxed. There are scores of ways to treat it, with or without filler, depending upon the cost and general effect desired.

The Use of "Stock" Materials

It is now pretty generally the custom to buy what are known as "stock" doors. Many large manufacturing concerns make a specialty of doors. These can be had in all sizes and shapes and in many beautiful designs, so the house-owner will have no difficulty in selecting those which go best, architecturally, with the style of his house. "Stock" doors usually have an advantage over doors made to order at a local mill, because they are, as a rule, better made. Door manufacturing has come to be a science, and concerns manufacturing in large quantities are usually better equipped to furnish well-made doors than local mills. Indeed, many local mills now buy their doors from door manufacturers, not attempting to manufacture them themselves.

The interior trim for a little house (such as window and door casings, baseboards, panels and the like) should be simple in pattern though not necessarily plain boards. Often it will be found that when woodwork is to be painted moldings look best; when woodwork is to be stained broad flat surfaces, displaying the grain of the wood, look best. There is no rule about this, however, and skilled architects use both molded and flat surfaces with good effect.

In many cases it is a good idea to use wall paneling in a dining-room or hall where wear on walls is most severe. When this is done care should be taken to have panels of simple design. Elaborate paneling with huge complicated moldings is certainly out of place in a little house, to say nothing about its excessive cost.

In the most carefully built houses

it is a custom to paint all trim on the back before it is nailed against the wall. Thus each length of wood is entirely protected by paint, and will be less liable, therefore, to swell in damp weather. Paneling should be protected on the back in the same way. Many architects require trim to be painted (or stained) on the face *before it is applied*, to protect it from dampness during the construction period. Of course no trim should be permitted in a building until the plaster is entirely dry. To keep a building dry all windows should be in place before any trim is sent to the building. Lumber is always dried out in a drying kiln before it is worked into trim and doors.

Paint, Stain, Wax and Varnish

In specifying paint, stain, wax or varnish the house-owner will be more certain of a good job if he specifies branded goods, giving the names of manufacturers plainly in his specifications. As previously stated, when a particular brand is specified (the owner can assure himself that he gets

the brand specified by insisting upon viewing the original cans or kegs) he has the backing of the manufacturer who made the goods. All reliable concerns feel the responsibility of maintaining the quality of their products and they use every endeavor to maintain uniformity. At the same time, it is a great convenience to the owner to have access to manufacturer's sample panels and color-cards showing precisely how any color effect is obtained. This eliminates all (often unsuccessful) experimenting on the part of a painting contractor, who need simply buy the goods specified.

For exterior paint (when the painter mixes his own) there are many reputable brands of white lead and zinc any of which should give entire satisfaction. It is usually wise to see the original package in which lead or zinc comes to assure yourself that the painter is using the brand specified.

White enamel is now used extensively for finishing interior woodwork. Enamel makes an excellent finish, most attractive and very durable. It may be wiped off or even washed without injury. There are many excellent brands backed up by reliable manufacturers.

When stain or wood dye is used

for woodwork there are several ways to finish it. First, after stain is applied to the wood you can merely wax it, producing an attractive dull gloss, or you may shellac or varnish it. As mentioned before, it is always better for the inexperienced owner to examine finished sample panels from manufacturers before he attempts to settle upon interior finishes. Then his painter can conform to the panels selected. This applies also to shingle stain, of which there are several well-known brands.

In using wax or varnish the same advice applies. Usually it pays to specify a particular brand of known quality, for many cheap, inferior waxes and varnishes are sold to painters, the use of which would make a poor, unsatisfactory job. Good brands, though costing more in the first place, will (if applied properly) give economical, enduring results.

For those who like the wearing qualities of varnish but do not care for a "shiny" finish there are several good brands of dull varnish.

On the interior walls

you may use paint, wall paper or one of the widely advertised brands of glazed wall coverings. When paint (calcimine or wall tint) is to be used it is often the custom to have the plaster walls finished slightly rough (called "sand finish.") When tinted a soft, velvety effect is produced that is quite pleasing. Ordinary calcimine can be used or one of the more permanent wall tints now so widely advertised.

Smooth walls are best for wall covering or wall paper. The former is now made in many pretty patterns of glazed cloth. This material can be used in kitchen, bathrooms and service quarters only, or throughout the house. It can be washed without injury, hence it is very popular with housekeepers.

Calcimine cannot be cleaned and must be renewed when soiled. Some of the better brands of wall finish, however, can be washed. Several are in the market. A little investigation on the part of the owner will convince him of their efficacy.

Interior Plastering

No advice on the interior finishing of a house would be complete without a few hints concerning interior plastering. In most cases a house is lathed and plastered inside, using 1½-inch laths and ordinary lime mortar. Unfortunately, one of the most difficult tasks in building is to secure a first-class job of plastering. When plasterers are at work such a muss exists in all the rooms that it is rarely possible for the owner or his architect to get inside until the plasterers are through. Even when the first coat is applied and drying ready for the second coat, one cannot usually tell whether the final coat will be straight and true or not. The best way to insure a good job is to employ only some plasterer who has the reputation of always doing good work. Mechanics should use a long, straight edge as a guide when putting on the final coat, so that all walls and ceilings will be straight and true, with none of those unpleasant undulating surfaces with which we are all so familiar. Before plastering it is a good thing to look over all the interior partitions and make sure the carpenters have made them straight and plumb.

Plaster board is often used with excellent results in place of laths. Plaster board is a composition of paper and plaster pressed under enormous hydraulic pressure into tough sheets, ready for nailing to the studs (thus no laths are required). One or two coats of finishing plaster is then applied. With plaster board it is easy to get a true job, because the plaster board itself furnishes a straight groundwork for the finishing plaster. Plaster board also has an advantage over laths in that it is comparatively fire-resisting.

For those who wish to dodge the entire plastering proposition there are numerous brands of wall board which come in sheets ready to nail directly to the studs. This material can be left in its natural state with no further finish (save strips of finishing wood nailed over the joints, forming panels), or it can be painted or treated with wall covering or wall paper. Some wall board is composed entirely of paper or pulp (cardboardlike in consistency) pressed under hydraulic pressure into tough, durable sheets. Another brand has a core of narrow strips of wood, with a tough paper finishing surface both sides. Technical names for such material vary, "wall board" and "composition board" being terms by which it is usually known.

Heating and Plumbing

The heating and plumbing system for a little house will, of course, demand a share of attention from the new house-owner desirous that his house shall be comfortable. Modern heating systems are much more efficient than old-fashioned ones. Modern hot-air furnaces, hot-water and steam-heating boilers have been developed to a very high state of efficiency, so if he chooses wisely, avoiding dealing with concerns whose reputation for fair dealing is not well established, the owner need anticipate no difficulty here.

Efficient heating apparatus is, of course, designed to perform the function of heating *with economy*. Any hot-air furnace, hot-water or

steam boiler which merely delivers an abundance of heat with no economy of fuel cannot be considered as desirable apparatus.

The idea prevailing in all best designs of heating apparatus is to secure *all the heat it is possible to get out of the fuel*, permitting only a small percentage of heat-producing gases to waste into the chimney.

Manufacturers issue catalogs containing cuts of the interior construction of their apparatus. Owners should realize that buying a heater is much like buying a watch—the inside is much more important than the outside.

Hot-air heat

is employed in many little houses and hot-air apparatus has many advantages—notably lower first cost. A modern hot-air furnace is very desirable, giving fresh, warmed air to the rooms in abundance when the furnace is large enough and pipes are properly installed. Any hot-air furnace should be tightly cased with iron, steel or brick. For economical fuel combustion the "radiator" contained in or near the combustion chamber should be sufficiently large to get all the heat possible out of the fuel. As an improvement upon the ordinary hot-air furnace, it is now possible to buy what is known as an "underfeed" furnace, one said to burn practically all the smoke, and hence more economical.

Combination hot-air and hot-water heaters are really hot-air furnaces containing a "heating coil" for supplying a few radiators with hot-water heat. Thus some rooms are warmed by means of hot-air registers and some with hot-water radiators.

Hot-water heaters

are said to burn less coal than hot-air furnaces and all rooms can be uniformly warmed, even in windy weather. Some boilers are made with cast-iron drums set one on top of the other ("vertical" type); others consist of sections set horizontally and coupled together ("horizontal" type); in other styles boilers are built of steel sheets riveted together.

Steam boilers are made in about the same way—that is, some are vertical, some horizontal and some are built of steel sheets, a somewhat different interior arrangement being provided, however, to produce a steam chamber in which steam collects before it enters the mains.

In a hot-water system boiler pipes and radiators are filled with water up to a point above the highest radiator (in attic), where the "expansion" tank is placed, the latter acting as a sort of safety-valve to permit expansion of hot water without straining the system.

Water in a steam system is contained in the boiler only. Usually the boiler is filled to a point about one-fourth below the top, the space thus left being the "steam chamber." Steam from this chamber enters the mains and passes rapidly to the radiators.

Radiators are of pressed steel (or iron) and cast iron. Hot-water patterns differ somewhat from steam patterns. Also hot-water valves are different, as well as hot-water piping, *one* pipe being frequently used for steam where *two* are required for hot water.

"Vacuum" or "vapor" heating systems are really steam systems with vacuum automatically maintained in the pipes. These are usually

considered too expensive for the average little house, most of which are equipped either with hot-air furnaces or hot-water heaters. The comparative cost of the various types is about as follows:

Comparative Cost of Heating Systems

(1) Hot Air.
(2) Steam.
(3) Hot Water.
(4) Vacuum or Vapor.

Plumbing

Plumbing comes right along in line with the heating. In fact, often the heating system is installed by the plumber, though not necessarily so, for "steam fitting" (as the trade is called) is a separate trade. Hot-air furnaces come usually in the tinsmith's contract.

In plumbing the same rules hold good as in heating. Use only standard apparatus, such as can be purchased from any reliable dealer. Most plumbing goods are now standard as to quality, standards having been adopted by all leading manufacturers.

Ware for ordinary plumbing fixtures comes in practically three most generally used materials—enameled iron, vitreous ware and porcelain. In addition to these there are the ordinary iron kitchen sinks (now practically obsolete), copper and German silver pantry sinks and soapstone and cement laundry tubs. Wooden laundry tubs are no longer used. Marble and slate kitchen sinks are much less used than formerly. Comparative cost of the three general materials mentioned above is as follows:

Comparative Cost of Plumbing Materials

(1) Enameled iron.
(2) Vitreous ware.
(3) Porcelain.

Thanks to progressive manufacturers whose magazine illustrations are viewed by millions, enameled iron is too well known to require description here. Very few house-owners would think of building without having a portion or all of their plumbing fixtures made of this excellent sanitary material.

Vitreous ware is similar to the crockery ware used for water-closets, and which can now be obtained in washbowls, as well. Also, vitreous ware has come greatly into demand for water-closet tanks. It is exceedingly durable, being acid proof.

Porcelain is rarely used in little houses, as it is usually considered too expensive. This ware looks something like crockery, though more creamy (yellowish) in shade. It is more liable to craze than vitreous ware.

The system of pipes to which the fixtures are attached should, of course, consist of a line of cast-iron pipe extending from basement to roof, through which it passes to the outside air. At the bottom of the "stack" (as it is called) a horizontal pipe slopes gradually to the line of tile pipe out in the yard, which connects with the cesspool or sewage system. In towns, of course, this line of tile pipe connects with the sewer under the street.

Thus the stack in a good job, receiving fresh air from above the roof at all times and with no holes or cracks permitting foul air to enter the house, is a complete, sanitary tube, through which sewage is carried away from the house. Where each washbowl, bathtub, sink and water-closet is attached to the stack a "trap" is provided; an ingenious device which permits waste to pass into the stack but prevents foul air from passing *out of* the stack into rooms.

The arrangement of the plumbing pipes in any house depends, of course, somewhat on the location of the house. For instance, in a town or city where sewer mains are in the streets a line of sewer pipe extends from the basement of the house out to the street, where it connects with the main trunk line. This connecting pipe is usually what is known as "tile sewer pipe," as it is not considered necessary to use cast-iron pipe for this purpose.

In the country there are no sewer mains in the streets, and each owner must, of course, provide either a catch basin for collecting the sewage or what is much better, a *septic sewage system.*

A catch basin is usually made of brick or concrete and the iron cover at the top permits emptying the catch basin once or twice each season.

The septic sewage system automatically disposes of house sewage and requires very little attention. A sewer pipe leads from the house to the "septic tank," the latter consisting of a concrete, brick, tile or cast-iron receptacle arranged so that the liquid part of the sewage flows away, the solid parts sinking to the bottom, where bacterial action automatically takes place and converts the solids into liquids. From the septic tank drain tile is laid in several branch lines just under the surface of the ground. Through these pipes liquid (now made harmless) from the septic tank flows and seeps into the earth, where nitrification takes place by contact with the air.

This is, broadly speaking, the process of all septic systems, though there are many varying methods of bringing about the result. Most manufacturers of septic tanks have skilled engineers, who are always glad to advise an owner about his sewage disposal problems, gratis.

Any one can readily see that the plumbing system should be the best that money can buy, and house-owners when considering plumbing bids should take into consideration the character of the bidders. Only a plumbing contractor employing expert mechanics should be considered. Plumbing fixtures (usually selected before specifications are written, so that they can be described in the latter) should be selected with the same care from manufacturers whose integrity is unquestionable.

Hardware

Hardware is an item of interior and exterior finish that often causes trouble later, when not wisely chosen. There are so many different kinds of locks, knobs and latches, to say nothing of countless sash-fasteners, cupboard-turns, drawer-pulls and other articles comparatively insignificant in themselves but of tremendous importance to the future comfort of the owner and his family, it is no wonder the array of goods is often quite bewildering.

In the average specification as drawn up by an architect individual items of hardware are not usually described. Most architects prefer to specify what is known as a "hardware allowance"—that is, a clause in the specifications something like this:

> Allow and pay the owner the sum of One Hundred Dollars for all finishing hardware used in the building.

As a result of this, every contractor when making out his bid includes in his price the sum of $100 for hardware. (N. B.—The amount, of course, varies according to the desires of the owner). Then the owner can later buy his hardware anywhere he wishes, spending as much as he likes up to the amount of $100.

There are many practical reasons why a hardware allowance is desirable instead of attempting to specify each piece in the specifications. An allowance included in the specifications protects the owner from "extras" (because it is involved in the original contract instead of coming in afterwards as an "afterclap"). At the same time, the allowance method gives the owner leisure to look about him during construction of the building and view patterns of hardware as made by different manufacturers.

Hardware should be purchased

with the understanding that "cheap" goods cannot be expected to wear as well as well-made goods. Iron or steel hardware plated with brass is not so durable as solid brass goods. "One-tumbler" locks are less secure and much more easily disarranged than "three" or "five" tumbler locks. Low-priced front-door sets are much less burglar-proof than better sets in which locks are built to be as pick-proof as possible.

Most manufacturers make cheap goods as well as better goods, and the owner can get precisely what he pays for when he trades with a reliable dealer whose statements as to quality are to be depended upon.

It may be said as a general thing that it does not pay to use anything but solid brass hardware for outside work in places where rain and snow can reach it. Iron or steel hardware, brass-plated, will wear for a time, but when the brass wears off rust is bound to result. Solid brass hardware is not necessarily expensive. Most manufacturers now make simple, inexpensive patterns in brass, costing but little more than cheaper goods.

Inside the house solid brass hardware is also desirable (any color finish can be used) but not absolutely necessary. Good, heavy plate on iron or steel may wear unsightly in time, but need not rust if kept away from the weather. Hinges for inside doors of little houses are most often steel, brass-plated.

The owner can get many helpful ideas from hardware catalogs, and when the matter comes up for definite decision he may go to his dealer and view the actual goods. Most manufacturers maintain information bureaus and are glad to answer questions, giving advice concerning any hardware problem.

As the Building Grows

Now your house, we will say, is well under way. All contracts have been let, the excavation for the cellar is made and masons have started to build the foundation walls. Right at this time the owner must determine just how much time he is to devote to what is known as "supervision." If he has an architect, of course, whose duty it is to supervise, it will not be necessary for the owner to pay any particular attention to the building unless he chooses. However, most people like to watch their homes go up, and few stay away entirely during construction. Whether an architect supervises the building or not, it is customary for the owner to pay some attention to the work. It is natural that he should be interested in viewing the building to build which is taking so many of his hard-earned dollars.

Avoid as much as possible giving orders on the job direct to contractors when you have an architect. You know what they say about "too many cooks." Contractors slyly joke about enthusiastic owners who spend all their time on the job and get in everybody's way. When you have a criticism to make concerning the work go directly to your architect and let him straighten it out with the contractor. Of course, if you are building without an architect's supervision you must handle all points yourself.

One of the first rules is patience. Under all circumstances you will get along much better if you treat everything in that calm way big business men take up the different problems they have to solve. In the first place, remember, when a little work, apparently poor, creeps into the job it does not necessarily follow that the contractor is trying to "put something over" on you. He is more or less at the mercy of his employees, and a mechanic or two may slip in some careless, slipshod work when their boss' back is turned. If you notice anything wrong don't scold and carry on, but politely ask that it be corrected, which will be willingly done if your contractor is the right kind of a man.

Sometimes Owners Expect a Job Too Perfect

It is often difficult for the inexperienced to determine just what a good job is. For instance, one might unreasonably expect the rough framework of a house to be built as slick and perfect as the most advanced grade of cabinet work; or it might be thought every piece of iron pipe should be without marks or rust stains—that every hand-made tile in the sun-room floor ought to be perfectly uniform and even.

To the experienced a good job is readily detected from a bad one. If the owner has had little to do with building houses he can get a line on construction by viewing some of his friends' houses. He should remember that no house, cost it ever so much, comes out as perfect as though cast in a mold, and in the little house it would be unreasonable to expect a contractor to put the same grade of workmanship that he would put into a $30,000 house.

Nevertheless, the little house should be *well built*. All work should be done by expert mechanics only, and no slipshod methods need be permitted.

The owner's wife often acts as building superintendent. Frequently she makes a most efficient helper in this capacity, though I have heard of a woman who sat on a nail keg all day and so embarassed workmen that she really caused more harm than good. A daily visit to the building by the owner's wife is entirly reasonable and may do much good if criticisms are just and made with a little tact. Many women really have a sort of genius as building superintendents. Often their eyes are very sharp and they detect something which the boss contractor and the architect have both missed. Some of the best built homes I have seen were supervised by women. No trouble is likely to ensue from a woman's supervision when she is intelligently diplomatic and her dealings are fair and square in every way.

Building a home is just like any other business proposition: You must give and take. It is unreasonable for you to expect the contractor to do the impossible. When delays are caused (and there will surely be delays) it is entirely right to try and make the work go faster, but you should not expect a contractor to put men on in such large numbers that they will not work efficiently. A little conference with a contractor, considering his point of view as well as your own, usually clears up your ideas amazingly.

Bad weather often sets work back. Then there are delays caused by non-arrival of material shipped from out of town. These things always happen, and when one stops to count up the great number of different trades represented in the building of even a small house—the large number of mechanics required, the dozens of different materials involved—one wonders how houses can be built with as little annoyance as they are.

Don't worry is a slogan which should be adopted by the owner, his wife and every member of his family. Push as hard as you can. Get your mechanics to work as fast as they can, but through it all be as fair and reasonable as you can.

Paying the Contractors

Most inexperienced owners are interested right at the start to know just what the custom is regarding payments to contractors. They need to know how much the different payments are and just when they will fall due, so that they can arrange to meet the amounts.

Usually a contract states how payments are to be made. For instance, a clause may be inserted stating that "$500 is to be paid when the foundation is completed, $1200 when the framework is completed and $300 when plumbing and heating pipes are roughed in," and so on.

The general custom is to hold back at least 15 per cent. of all money the contractor is entitled to until the work is done and accepted by the owner. For instance, when a contractor has done five hundred dollars' worth of work and a payment is due give him but four hundred and twenty-five dollars, reserving the remaining 15 per cent. until the wind-up of the job. This sum held in reserve is to protect you and secure for you the assurance that the job will be completed according to contract. If a contractor should fail to perform his contract and it becomes necessary for you to engage another contractor to complete it in his place you have this 15 per cent. out of which to pay the other contractor.

When there is no architect

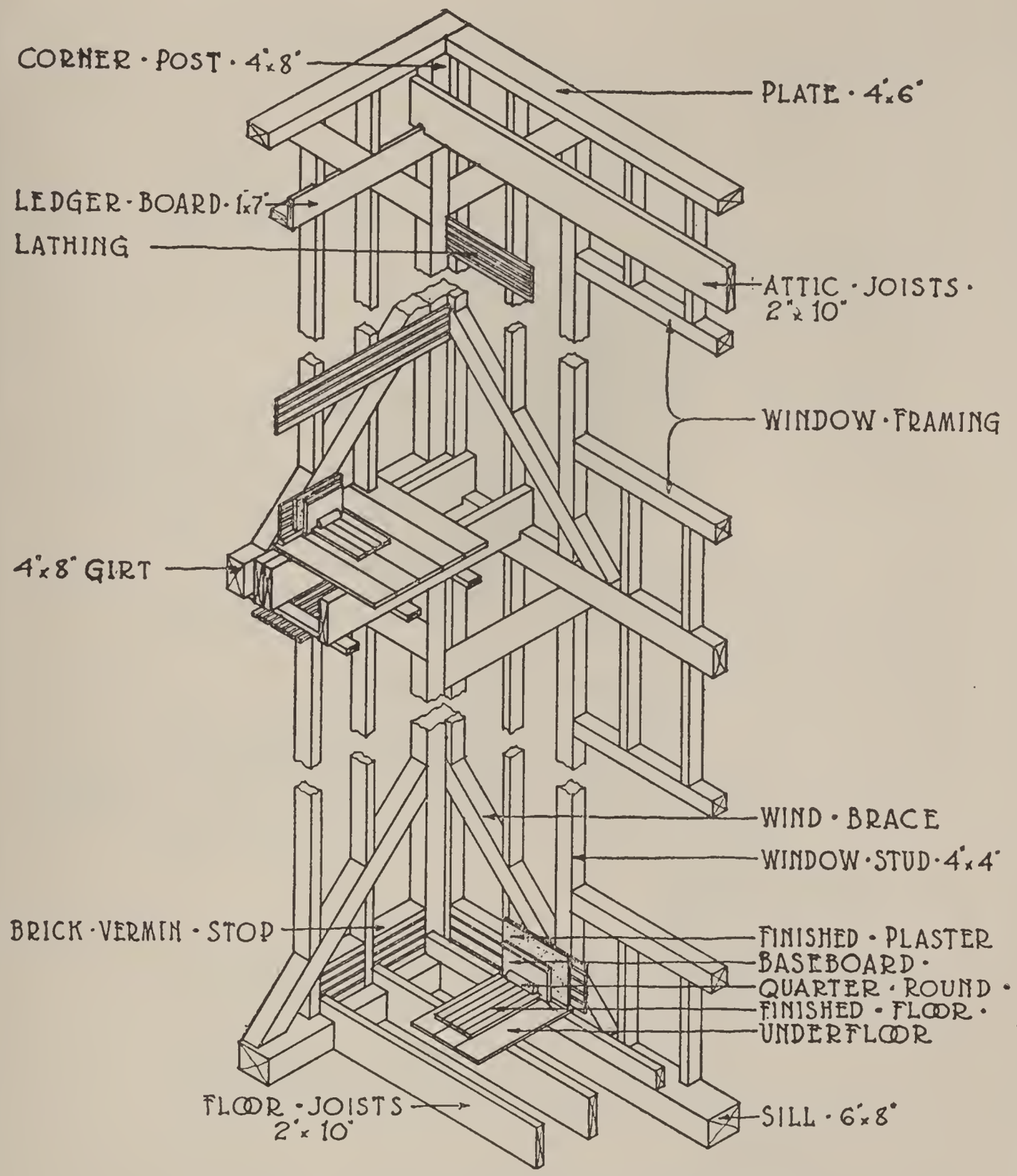
a lawyer's advice concerning payments is often well worth while. When payments are made it is customary to demand from the contractor a "waiver of lien" covering the work for which payment is made. After the building is entirely completed a waiver of lien is usually required from each contractor for all labor and materials used in the completed house. Such a legal instrument makes it impossible for contractors (through error or otherwise) to come back and collect again from the owner.

Often delays in building are caused by the owner himself, who does not decide promptly matters left to his decision. Thus he may not pick out the kind of brick for foundation and chimney promptly, and the mason loses a few days waiting for the owner to make up his mind.

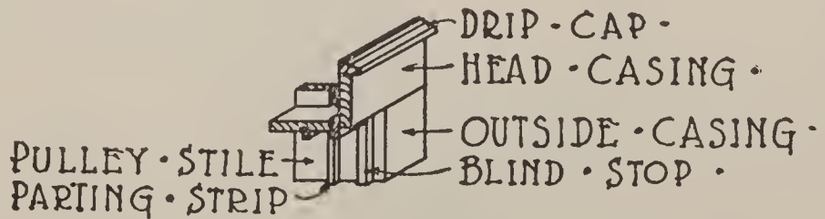
Much of the material used in a house comes from distant points. Plumbing and heating goods must often be shipped from out of town, often taking five or six weeks to reach the job (allowing for delays in ordering and in filling the order). The owner will greatly facilitate matters by making all selections promptly.

All things considered, the building of a house, little or big, is a desirable experience never to be forgotten—a happy undertaking if the problem is considered wisely and one looks at everything broadly and fairly.

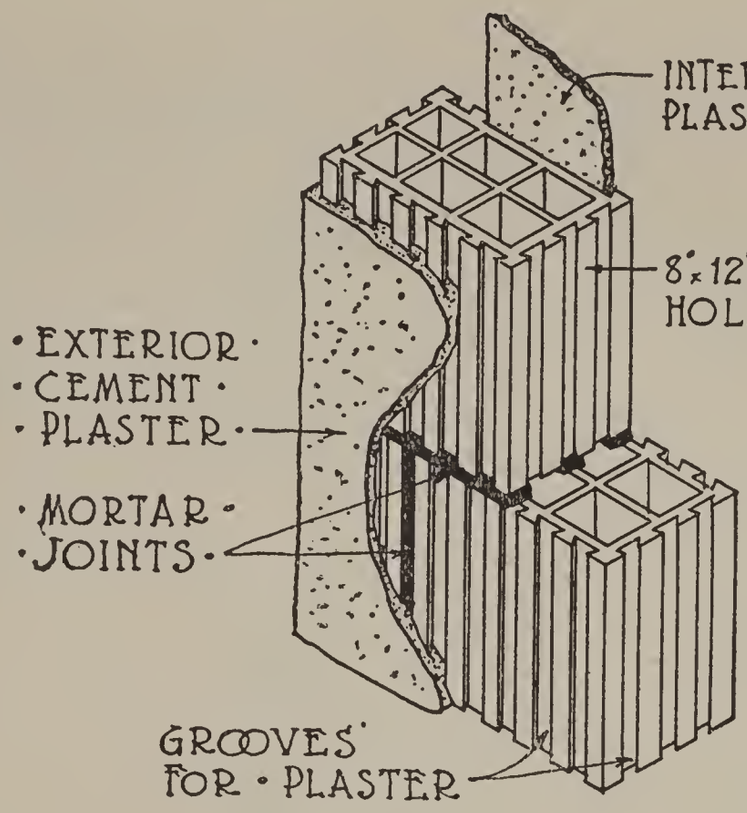
NOTE.—The Architectural Editor will be glad to name specifically first-class manufacturers who standardize their goods, if a stamped, addressed envelope is enclosed with the request.



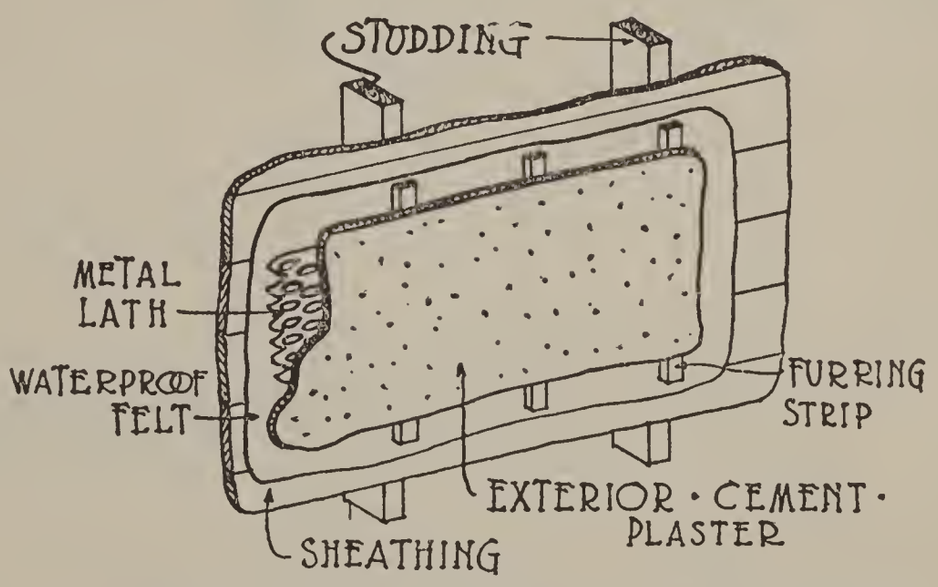
EASTERN TYPE OF FRAMING FOR A FRAME HOUSE



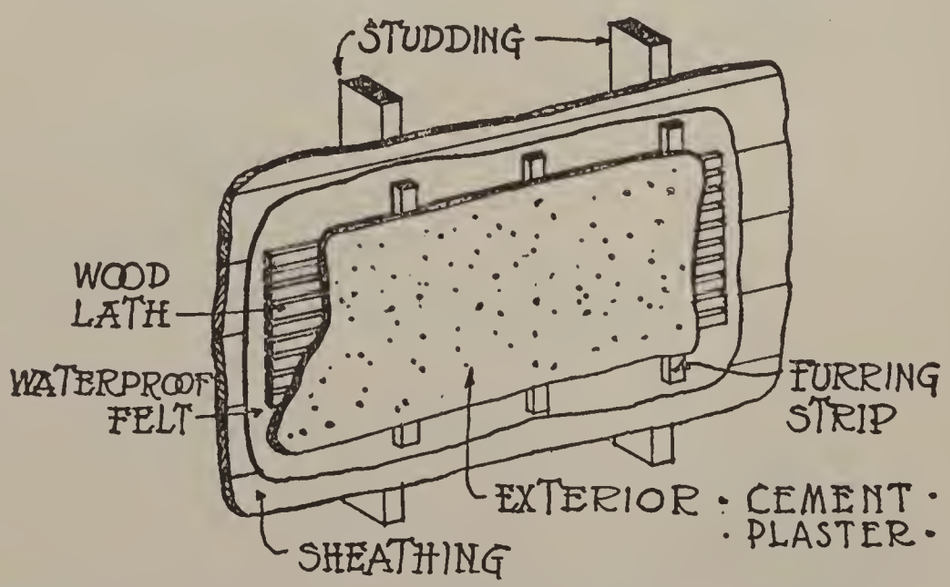
WINDOW FRAMES SUCH AS CAN BE BOUGHT AT ANY MILL



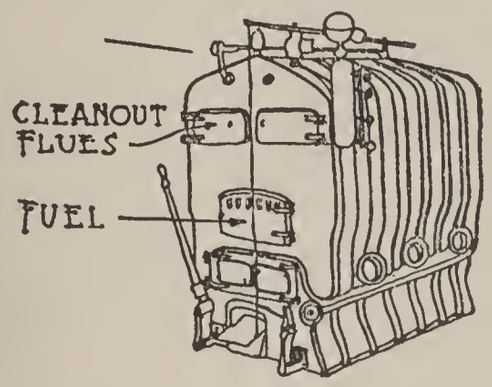
ONE METHOD OF LAYING HOLLOW TILE FOR TILE STUCCO HOUSE



EXTERIOR CEMENT PLASTER ON METAL LATHING

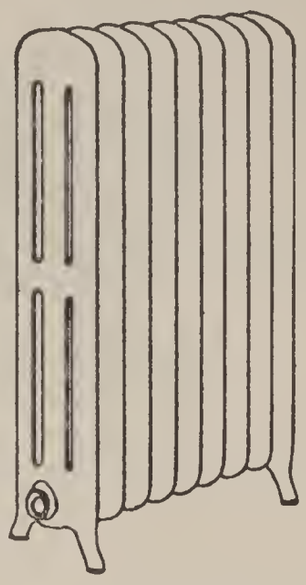


METHOD OF PLASTERING ON EXTERIOR BY MEANS OF WOOD LATHS

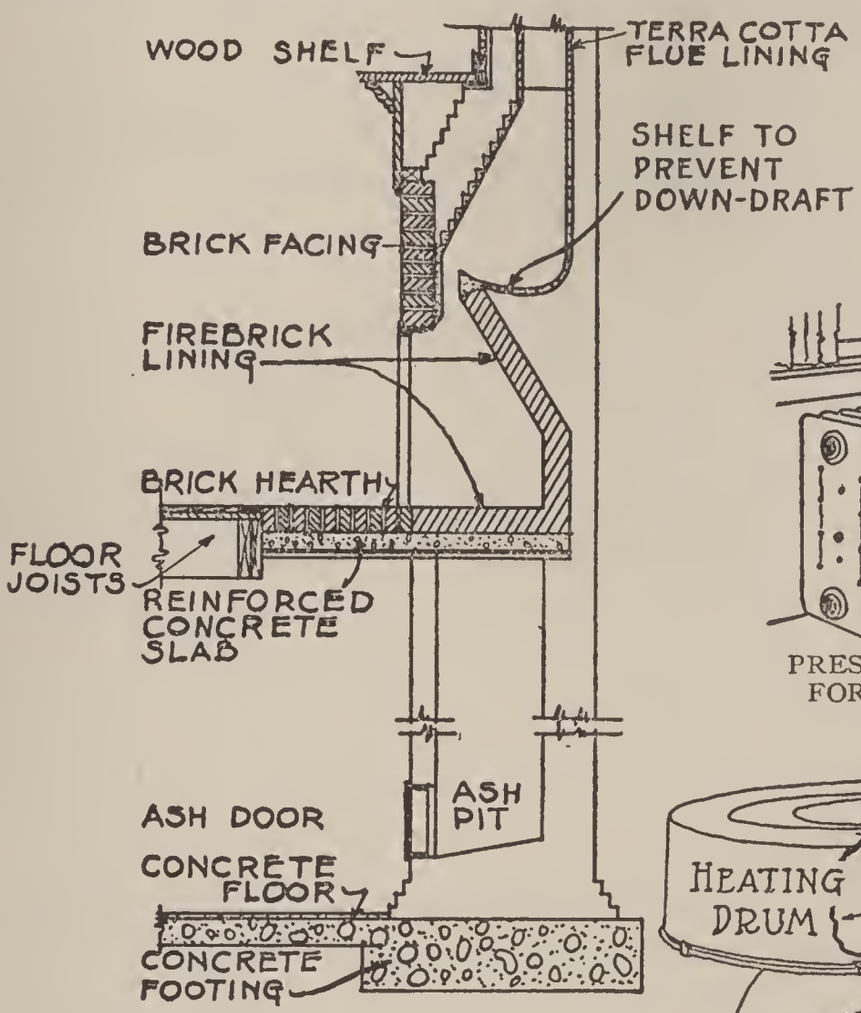


HORIZONTAL SECTIONAL CAST-IRON BOILER FOR STEAM

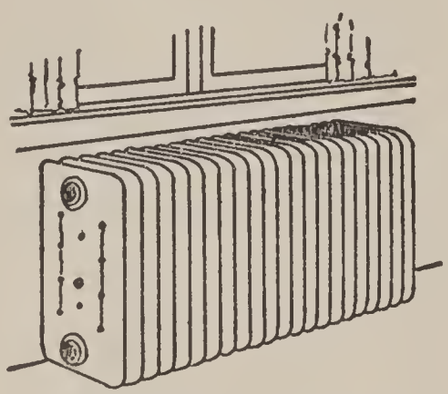
VERTICAL SECTION OF CAST-IRON HOT-WATER BOILER.



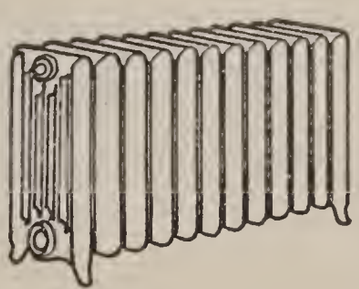
THREE-COLUMN STEAM RADIATOR OF CAST IRON



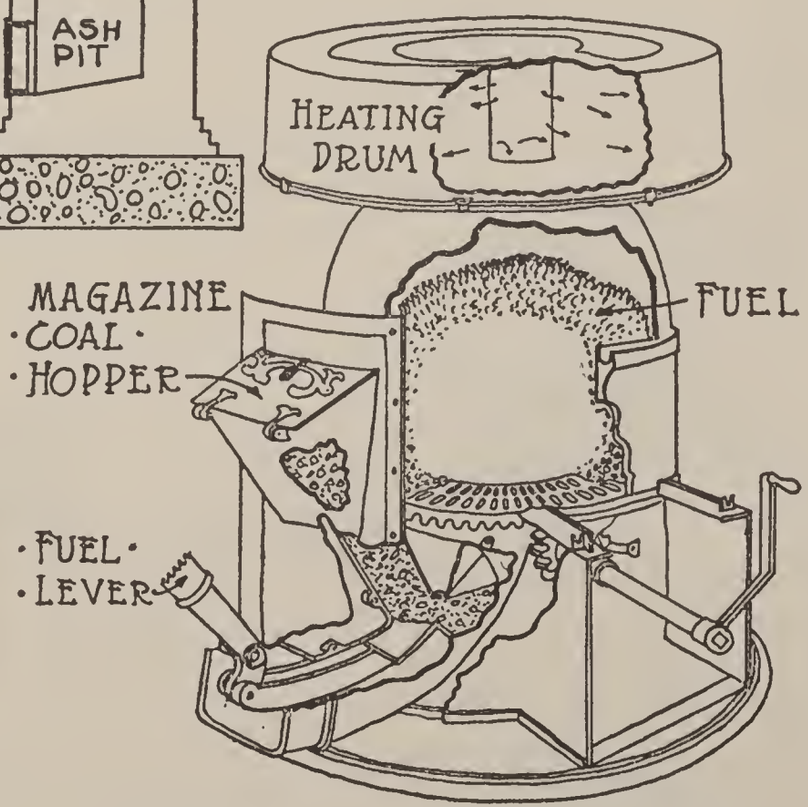
A GOOD WAY TO BUILD A SMOKELESS FIREPLACE



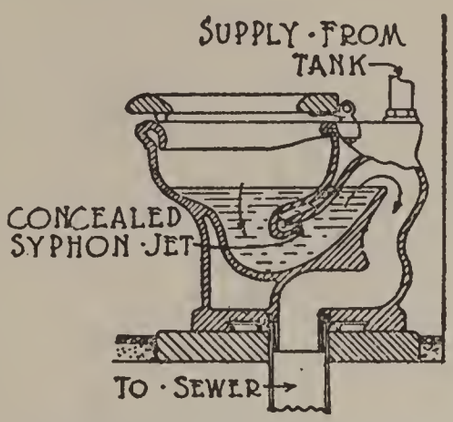
PRESSED-IRON RADIATOR FOR UNDER A WINDOW



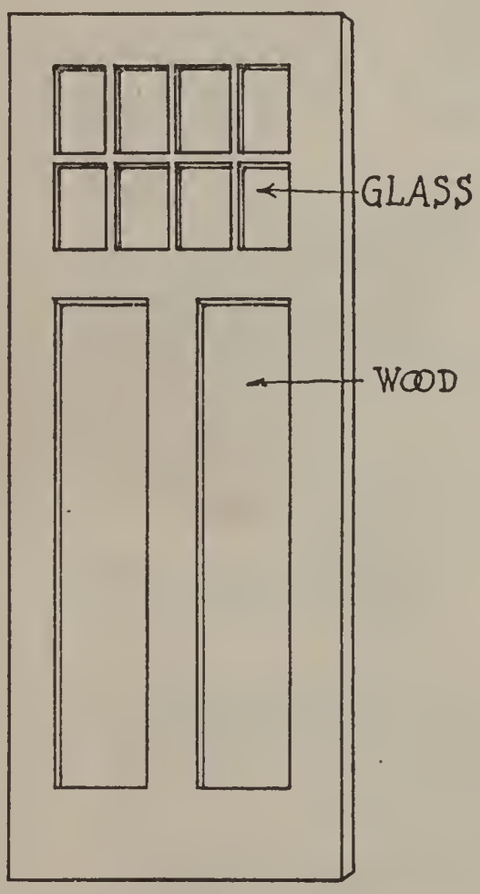
CAST-IRON LOW RADIATOR FOR HOT-WATER HEAT



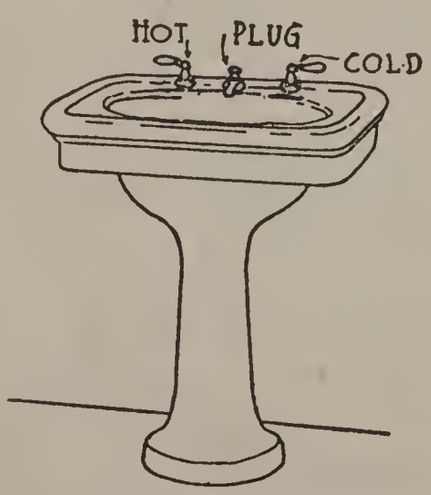
UNDERFED HOT-AIR FURNACE TO WHICH FUEL IS FED FROM UNDERNEATH



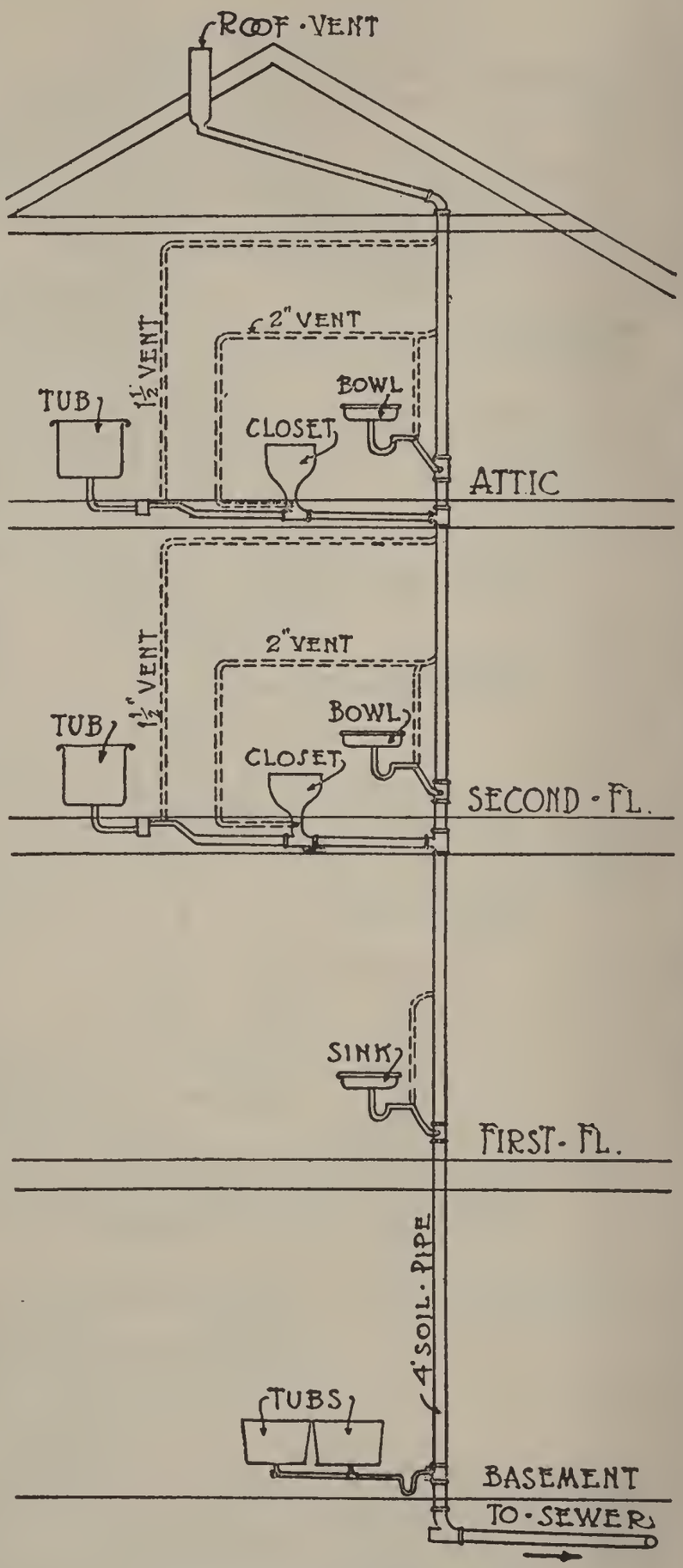
SECTIONAL VIEW OF SILENT TYPE OF SYPHON JET CLOSET



GOOD STOCK DESIGN FOR A FRONT DOOR



VITREOUS WARE PEDESTAL LAVATORY



SANITARY PLUMBING STACK

3477-281
lot 40

Deacidified using the Bookkeeper process.
Neutralizing agent: Magnesium Oxide
Treatment Date: May 2004

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